A comprehensive diagnostic coding system for infections managed in primary care: the single most cost-effective step to improve antimicrobial stewardship?

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Antibiotics are one of the most commonly prescribed medicines in primary care internationally, but as many as 23% in the UK,[1] and 25% in the US, [note to editor – please add ref to Ray et al here] are prescribed inappropriately. Governments concerned about the threat of antibiotic resistance have repeatedly called for improved stewardship to preserve antibiotic effectiveness for future generations.[2] [3] [4]

Reducing inappropriate prescribing means individual clinicians changing their behaviour. Providing individualised peer-referenced prescribing data is a proven method for supporting behaviour change,[5] because it provides a strong counter to clinicians who justify their prescribing by arguing they see a different group of patients – for example older patients with more comorbidities, or more patients with acute problems. In the author's opinion, an individualised peer referencing clinician feedback system would work optimally if it met three criteria. The first is that a diagnostic code is used every time an antibiotic is prescribed.

It may surprise some readers that a significant proportion of antibiotics prescribed in primary care are issued without a diagnostic indication recorded in the medical record. Strong evidence for this is provided in a paper published in this week's *BMJ*. [note to editor – please add ref to Ray here] Ray *et al* show that of the antibiotics prescribed to 130 million Americans in 2015 (collected from nearly 1 billion ambulatory care visits), there was no coded indication in 18%. A recent UK study found an even higher percentage (36%) of antibiotics were prescribed without a coded diagnosis between 2013 and 2015.[1]

This may reflect diagnostic uncertainty. Most patients do not present with neatly differentiated infection symptoms that can be converted into a definitive diagnosis, so using a definitive diagnostic code would not reflect reality, even when an antibiotic is considered necessary. Worse, it could result in harm because subsequent consultations (especially with a different clinician) might put too much reliance on the original diagnosis and discourage reassessment. Therefore, improving the completeness of diagnostic coding could be achieved by increasing the use of 'provisional' diagnostic codes (e.g. 'suspected UTI'). Second, Ray *et al* [note to editor – please add ref to Ray et al here] show longer vs. shorter consultations were more likely to result in an antibiotic without indication, perhaps reflecting more complex patients, 'coding fatigue' or insufficient consultation time.

The second criterion is that all infections should be coded, not just those resulting in an antibiotic prescription. To explain this criterion, we invite readers to consider how an individual clinician might determine if their prescribing is appropriate using existing data. They could conduct an audit to compare prescribing against quality indicators, such as those published by Adriaenssens *et al* in 2011.[6] Developed by a panel of European experts, these provide acceptable prescribing ranges by infection. For example, they suggest no more than 30% of adults less than 75 years with acute bronchitis should receive an oral antibiotic. Recommended percentages are also given for acute upper respiratory tract infection (≤20%); acute tonsillitis (≤20%); acute/chronic sinusitis (≤20%); acute otitis media (≤20%); acute urinary tract infection in adult women (≥80%); and pneumonia in adults aged up to 65 (≥90%).

Having ensured that a diagnostic code is used every time an antibiotic is prescribed, and that all infections are coded, the third criterion would be to use a global measure of illness severity (such as mild, moderate or severe) with each diagnostic code, so that clinicians could evaluate if they are seeing patients with more severe illness.

Using the above criteria, an individualised feedback system could provide clinicians with data regarding their use of diagnostic codes and antibiotics in relation to peers. It would also allow clinicians to monitor their use of more severe infection codes, such as tonsillitis and pneumonia which might otherwise be used to justify prescribing decisions,[7] as well as the proportion of patients with each condition for whom they prescribe. Those with responsibility for antimicrobial stewardship might wish to work with electronic health record providers and clinicians to encourage such diagnostic coding.

Of course, what is proposed here is only one of a raft of antimicrobial stewardship strategies needed to improve prescribing, none of which will work in isolation. Others include improving infection control, vaccination, and improved diagnostic precision, but the incentive for improving diagnostic coding to provide information that can be used by clinicians to help them reflect and refine prescribing behaviour.

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Competing interest and copyright statements

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